



Space Launch System Secondary Payloads

SLS Advances Science and Technology: CubeSat Payloads on NASA's Artemis I Mission

NASA's new rocket, the Space Launch System (SLS), will launch America into a new era of exploration to destinations beyond Earth's orbit. In addition to demonstrating NASA's new heavy-lift capability and sending the Orion spacecraft into deep space, SLS also has the capability to carry CubeSats to deep space. CubeSats are small, low-cost experiments not much larger than a shoebox.

These secondary payloads may be science and technology investigations or technology demonstrations that help pave the way for future, deep space human exploration.

On this first flight, known as Artemis I, SLS will launch an uncrewed Orion spacecraft to a stable orbit beyond the Moon to demonstrate the integrated system performance of Orion and the SLS rocket.

From the lunar vicinity, Orion will return to Earth to demonstrate re-entry and landing prior to a crewed flight. This mission also provides the rare opportunity for CubeSats to reach deep space destinations; most launch opportunities for CubeSats are limited to low-Earth orbit.

The Artemis I flight has 10 CubeSats manifested that are 6U in size (one U, or unit, is 10 cm x 10 cm x 10 cm).

The Orion stage adapter on the Block 1 SLS vehicle connects Orion to the upper stage and can potentially accommodate up to 17 CubeSats in a combination of 6U or 12U sizes, although only 10 CubeSats are riding along on the Artemis I flight. An additional slot is

reserved for the avionics unit that controls the CubeSats' deployment in deep space.

Several of the CubeSats chosen to fly on Artemis I are lunar-focused and were proposed by programs across the agency. These missions may help the agency address Strategic Knowledge Gaps (SKGs) to inform research strategies and prioritize technology development for human and robotic exploration.

Other missions will be testing innovative propulsion technologies, studying space weather, analyzing the effects of radiation on organisms, and providing high-resolution imagery of the Earth and Moon. Three of these CubeSats are competing in the Cube Quest Challenge, vying for prizes for accomplishing such goals as farthest communication to Earth from space.



The completed Orion stage adapter for the SLS rocket for the Artemis I flight, with the mounting brackets for CubeSats in their dispensers.

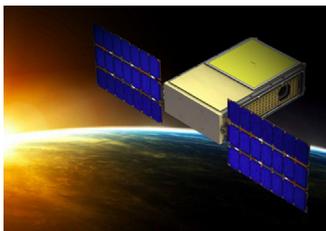
NASAfacts

Secondary payloads on SLS not only provide CubeSat developers with an exceptional opportunity to deploy CubeSats in deep space, they also enable NASA to engage with international partners, industry, and students. International space agency partners are providing three payloads, and universities are involved with five payloads.

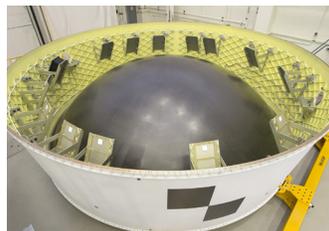
The CubeSats will be deployed following Orion separation from the upper stage once Orion is a safe distance away. Each payload will be ejected with a spring mechanism from dispensers installed on the Orion stage adapter. The SLS program provides a secondary payload deployment system for the CubeSats which includes the deployment system, an avionics unit, mounting brackets for the dispensers, cable harnesses, and a vibration mitigation system.

The initial SLS rocket variant, Block 1, can launch at least 59,525 lbs. (27 metric tons) to the Moon and will be powered by twin solid rocket boosters and four RS-25 engines. The next planned evolution of the SLS, Block 1B, will use a more powerful exploration upper stage to enable more ambitious missions. This version will be capable of launching more than 92,594 lbs. (42 metric tons) to cislunar space.

A later evolution, Block 2, will onramp evolved solid rocket boosters to provide a 101,400 lb. (46 metric ton) lift capacity to the Moon. These future configurations of the vehicle will allow for larger and more varied payload capabilities. Each SLS configuration will incorporate the same core stage design and use four RS-25 engines.



Artist concept of a CubeSat deployed in deep space.



Completed Orion stage adapter with the secondary payload deployment system installed.

For more information on SLS, visit:

<http://www.nasa.gov/sls/>

http://www.twitter.com/NASA_SLS

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Artemis I Secondary Payload Facts

Number of manifested CubeSats: 10

Deployment opportunities are along the upper stage disposal trajectory.

Weight Limit: 30 pounds (14 kilograms)

Size: 6U (4.4" x 9.4" x 14.4")
Equivalent to six 10 cm square units)

The Secondary Payload Deployment System includes an avionics unit, mounting brackets, cable harnesses, and a vibration mitigation system.

When mission parameters allow, the SLS program hopes to offer CubeSats, in various sizes, rideshare opportunities to deep space.

